Intensity rises in nitride LED patent disputes

Nichia Corp (Tokyo, Japan) has filed a Sherman Act anti-trust claim in the US District Court for the Eastern District of Pennsylvania asserting that:
• **Rohm Co Ltd** (Kyoto, Japan) and **Cree Inc** (Durham, CA, USA) entered into a conspiracy to exclude Nichia from the US market (culminating in several agreements, in particular that Rohm fabricated a domestic industry to obtain ITC jurisdiction through a license agreement with Cree in December 2000, three days before Rohm filed its ITC complaint against Nichia); and
• Rohm knowingly asserted fraudulently obtained and invalid US patents against Nichia.

The claim allows Nichia to pursue discovery which Nichia believes Rohm attempted to avoid by withdrawing its ITC complaint in April 2001 seven days after the ITC judge ordered discovery on anti-trust issues and shortly before Rohm was required to submit related documents (see Issue 5, page 22). The claim also allows Nichia to pursue monetary damages and injunctive relief against Rohm and Cree.

While all actions against Nichia in the ITC terminated in July 2001, a separate proceeding against Rohm before the ITC is still pending. After Rohm withdrew its ITC complaint, the ITC judge ordered Rohm to file a statement explaining factual details relating to Rohm's licensing transactions with Cree (see Issue 7, page 22). The judge has the option to sanction Rohm (in the form of a monetary penalty) or start an ancillary proceeding to investigate the matter further.

* The Tokyo District Court has dismissed the lawsuit filed in April 2000 by Nichia Corp against **Sumitomo Corp** - a distributors in Japan for Cree Inc (Durham, NC, USA) - finding that Cree's products "did not infringe the patent".

Nichia alleged that certain Cree LED products (high-brightness LEDs and certain low-current LEDs) infringe Japanese Patent No. 2,778,405, seeking an injunction against sale in Japan.

Cree argued that its (SiC-based LED) products use a fundamentally different structure.

* In late October **Cree** launched its next-generation "X-Bright" family of blue-spectrum LEDs.

The chip design and the optical benefits of SiC (maintaining the vertical structure advantages of a single top contact) allow about 50% greater brightness than its "MegaBright" LEDs, albeit with a standard-size chip similar to Cree's other SiC/GaN-based devices.

Cree is also producing its newest MegaBright LED, the 505 traffic signal green device. Typical brightness is 8 mW (more than double the current UltraBright 505 green LED brightness).

Power consumption for a green LED traffic signal is 8-12 W (versus 135-165 W for an incandescent bulb).

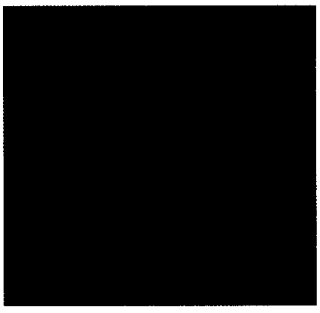
AXT raises LED brightness 30%

Simultaneous with a major ramp-up in LED production, **AXT Inc** (Fremont, CA, USA) has launched green, cyan and blue AlInGaN-based high-brightness LEDs 30% brighter than its previous-generation LEDs (for the video display, traffic signal and backlighting markets). Typical output powers (at 20 mA) are 2.0, 2.2, and 3.0 mW, respectively. Expected packaged lamp power outputs are 4.0, 4.4, and 6.0 mW.

Osram doubles AlGaInP HB-LED brightness

Osram Opto Semiconductors (Regensburg, Germany) has more than doubled the luminous efficacy of its AlGaInP LED.

In late 2000 it developed a new surface-structured LED reaching 25-30 lm/W in orange and red. However, although the light is internally produced with a high degree of efficiency, a large proportion is absorbed by the GaAs substrate.



Osram Opto's double-brightness (50 lm/W) substrate-less red (615 nm) AlGaInP LED.

Osram therefore replaces the GaAs substrate by bonding a thin, light-generating 4" wafer, resulting in a much higher yield of chips per wafer and cost-efficient mass production. The intermediate metal film is partially alloyed, allowing the alloyed part to act as an electrical contact and the non-alloyed part as a highly-reflective mirror, allowing more light to be emitted than conventional LEDs. Substrate-less red LED (615 nm) can achieve a luminous efficacy of more than 50 lm/W.

White LEDs: Toyoda launches; Nichia licenses

Nichia Corp - which has been selling white LEDs since 1996 - is for the first time licensing its patents covering the combining of GaN-based blue LEDs with YAG yellow phosphor (but not the blue LED technology).

Citizen Watch Co Ltd subsidiary **Citizen Electronics Co Ltd** (which claims the world's largest production share in surface-mount LEDs) will produce surface-mount white LEDs and sell them through its own sales channels. It will supply a portion of the products to Nichia on an OEM basis.
In November blue LED supplier **Toyoda Gosei Co Ltd** (Nagoya, Japan) launched a "White Hi" white LED (in a 3 mm x 3 mm surface-mount package) with brightness of 400 mcd at 20 mA forward current (compared to Nichia's 370-430 mcd).

It says it does not use a YAG yellow phosphor but a new phosphor licensed from developers Tridonic Optoelectronics GmbH (Austria), Leuchtstoffwerk Breitungen GmbH and Litec GbR (Germany). The four have applied for a joint patent worldwide. In January Toyoda Gosei was also due to start production of another type of white LED, co-developed with Toshiba Corp.

* Last September **Osram Opto Semiconductors** (Regensburg, Germany) filed two intellectual-property lawsuits claiming infringement of:
• US Patent Nos 6,066,861 and 6,245,259, against Nichia Corp, Japan and Nichia America Corp in the US District Court for the Eastern District of Pennsylvania;
• German Utility Model No 297 24 382.9, against Nichia Corp, Japan and Nichia Chemical Europe GmbH in the Landgericht München,
relating to the technology for making single-chip mixed-colour LEDs. Osram claims that Nichia has infringed its rights by importing white LEDs into the USA and Germany.